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**METHOD AND APPARATUS FOR REMOVING CONFIDENTIAL
INFORMATION FROM A HISTORY**

CROSS REFERENCE TO RELATED APPLICATIONS

5 The present invention is related to *Method and
Apparatus for Viewing and Managing Information in a
History*, serial no. 09/_____, attorney docket no.
AUS920010545US1 and *Method and Apparatus for Removing
Information from a Server*, serial no. 09/_____,
attorney docket no. AUS920010546US1, filed even date
10 hereof, assigned to the same assignee, and incorporated
herein by reference.

BACKGROUND OF THE INVENTION

1. Technical Field:

15 The present invention relates generally to an
improved data processing system, and in particular to a
method and apparatus for managing data. Still more
particularly, the present invention provides a method,
apparatus, and computer implemented instructions for
removing confidential information from a history
20 generated by a browser.

2. Description of Related Art:

25 The Internet, also referred to as an "internetwork",
is a set of computer networks, possibly dissimilar,
joined together by means of gateways that handle data
transfer and the conversion of messages from protocols of
the sending network to the protocols used by the

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receiving network (with packets if necessary). When capitalized, the term "Internet" refers to the collection of networks and gateways that use the TCP/IP suite of protocols.

5 The Internet has become a cultural fixture as a source of both information and entertainment. Many businesses are creating Internet sites as an integral part of their marketing efforts, informing consumers of the products or services offered by the business or
10 providing other information seeking to engender brand loyalty. Many federal, state, and local government agencies are also employing Internet sites for informational purposes, particularly agencies, which must interact with virtually all segments of society such as
15 the Internal Revenue Service and secretaries of state. Providing informational guides and/or searchable databases of online public records may reduce operating costs. Further, the Internet is becoming increasingly popular as a medium for commercial transactions.

20 Currently, the most commonly employed method of transferring data over the Internet is to employ the World Wide Web environment, also called simply "the Web". Other Internet resources exist for transferring information, such as File Transfer Protocol (FTP) and
25 Gopher, but have not achieved the popularity of the Web. In the Web environment, servers and clients affect data transaction using the Hypertext Transfer Protocol (HTTP), a known protocol for handling the transfer of various data files (e.g., text, still graphic images, audio,
30 motion video, etc.). The information in various data files is formatted for presentation to a user by a standard page description language, the Hypertext Markup

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Language (HTML). In addition to basic presentation formatting, HTML allows developers to specify "links" to other Web resources identified by a Uniform Resource Locator (URL). A URL is a special syntax identifier
5 defining a communications path to specific information. A URL identifies each logical block of information accessible to a client, called a "page" or a "Web page". The URL provides a universal, consistent method for finding and accessing this information, not necessarily
10 for the user, but mostly for the user's Web "browser". A browser is a program capable of submitting a request for information identified by an identifier, such as, for example, a URL. A user may enter a domain name through a graphical user interface (GUI) for the browser to access
15 a source of content. The domain name is automatically converted to the Internet Protocol (IP) address by a domain name system (DNS), which is a service that translates the symbolic name entered by the user into an IP address by looking up the domain name in a database.
20 There are a number of ways to find out what Web pages have been viewed in a browser. For example, a disk cache is present in which various files, such as graphic images, are stored with respect to a Web page. Additionally, a history list is often recorded to
25 identify URLs that have been visited by a user. Also, a location list containing URLs entered by the user is present. Other types of disk caches include cookies for various Web sites, which are stored in a cookie file for the browser. This recorded information is an example of
30 a history that may be recorded for a Web page received by a user or a Web site visited by the user. These histories also may contain confidential or personal

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information.

In some instances, a user may desire to prevent others from identifying confidential or personal information that may be located in history. Currently, a user is required to go back through the history and locate the Web pages or cookies that may contain the confidential or personal information and delete the information from the history. The procedure would include, for example, deleting files in a disk cache and deleting cookies in a cookie file. Such a procedure is tedious and often difficult for many users.

Therefore, it would be advantageous to have an improved method and apparatus for eliminating confidential information in a history.

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SUMMARY OF THE INVENTION

The present invention provides for a method and apparatus for removing information in a data processing system. A selection of information for removal is
5 received, wherein the selection is received prior to a browser session. A history is generated during the browser session. In response to a termination of the browser session, the information is automatically removed from the history using the predetermined selection
10 without requiring a user input.

Patent 6,644,336

BRIEF DESCRIPTION OF THE DRAWINGS

The novel features believed characteristic of the invention are set forth in the appended claims. The invention itself, however, as well as a preferred mode of use, further objectives and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

Figure 1 is a pictorial representation of a data processing system in which the present invention may be implemented in accordance with a preferred embodiment of the present invention;

Figure 2 is a block diagram of a data processing system in which the present invention may be implemented;

Figure 3 is a diagram illustrating components used in disabling recording of a history in accordance with a preferred embodiment of the present invention;

Figure 4 is a block diagram of a browser program in accordance with a preferred embodiment of the present invention;

Figure 5 is a diagram of graphical user interface for defining privacy preferences in accordance with a preferred embodiment of the present invention;

Figure 6 is a diagram of a input window in accordance with a preferred embodiment of the present invention;

Figure 7 is a diagram of a preview of Web pages in accordance with a preferred embodiment of the present invention;

Figure 8 is a diagram of a Web page presented in a window in accordance with a preferred embodiment of the present invention;

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preferred embodiment of the present invention;

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DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference now to the figures and in particular with reference to **Figure 1**, a pictorial representation of a data processing system in which the present invention may be implemented is depicted in accordance with a preferred embodiment of the present invention. A computer **100** is depicted which includes a system unit **102**, video display terminal **104**, keyboard **106**, storage devices **108**, which may include floppy drives and other types of permanent and removable storage media, and mouse **110**. Additional input devices may be included with personal computer **100**, such as, for example, a joystick, touchpad, touch screen, trackball, microphone, and the like. Computer **100** can be implemented using any suitable computer, such as an IBM RS/6000 computer or IntelliStation computer, which are products of International Business Machines Corporation, located in Armonk, New York. Although the depicted representation shows a computer, other embodiments of the present invention may be implemented in other types of data processing systems, such as a network computer. Computer **100** also preferably includes a graphical user interface that may be implemented by means of systems software residing in computer readable media in operation within computer **100**.

With reference now to **Figure 2**, a block diagram of a data processing system is shown in which the present invention may be implemented. Data processing system **200** is an example of a computer, such as computer **100** in

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Figure 1, in which code or instructions implementing the processes of the present invention may be located. Data processing system **200** employs a peripheral component interconnect (PCI) local bus architecture. Although the depicted example employs a PCI bus, other bus architectures such as Accelerated Graphics Port (AGP) and Industry Standard Architecture (ISA) may be used. Processor **202** and main memory **204** are connected to PCI local bus **206** through PCI bridge **208**. PCI bridge **208** also may include an integrated memory controller and cache memory for processor **202**. Additional connections to PCI local bus **206** may be made through direct component interconnection or through add-in boards. In the depicted example, local area network (LAN) adapter **210**, small computer system interface (SCSI) host bus adapter **212**, and expansion bus interface **214** are connected to PCI local bus **206** by direct component connection. In contrast, audio adapter **216**, graphics adapter **218**, and audio/video adapter **219** are connected to PCI local bus **206** by add-in boards inserted into expansion slots. Expansion bus interface **214** provides a connection for a keyboard and mouse adapter **220**, modem **222**, and additional memory **224**. SCSI host bus adapter **212** provides a connection for hard disk drive **226**, tape drive **228**, and CD-ROM drive **230**. Typical PCI local bus implementations will support three or four PCI expansion slots or add-in connectors.

An operating system runs on processor **202** and is used to coordinate and provide control of various components within data processing system **200** in **Figure 2**. The operating system may be a commercially available operating system such as Windows 2000, which is available from

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Microsoft Corporation. An object oriented programming system such as Java may run in conjunction with the operating system and provides calls to the operating system from Java programs or applications executing on data processing system **200**. "Java" is a trademark of Sun Microsystems, Inc. Instructions for the operating system, the object-oriented programming system, and applications or programs are located on storage devices, such as hard disk drive **226**, and may be loaded into main memory **204** for execution by processor **202**.

Those of ordinary skill in the art will appreciate that the hardware in **Figure 2** may vary depending on the implementation. Other internal hardware or peripheral devices, such as flash ROM (or equivalent nonvolatile memory) or optical disk drives and the like, may be used in addition to or in place of the hardware depicted in **Figure 2**. Also, the processes of the present invention may be applied to a multiprocessor data processing system.

For example, data processing system **200**, if optionally configured as a network computer, may not include SCSI host bus adapter **212**, hard disk drive **226**, tape drive **228**, and CD-ROM **230**, as noted by dotted line **232** in **Figure 2** denoting optional inclusion. In that case, the computer, to be properly called a client computer, must include some type of network communication interface, such as LAN adapter **210**, modem **222**, or the like. As another example, data processing system **200** may be a stand-alone system configured to be bootable without relying on some type of network communication interface, whether or not data processing system **200** comprises some type of network communication interface. As a further

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example, data processing system **200** may be a personal digital assistant (PDA), which is configured with ROM and/or flash ROM to provide nonvolatile memory for storing operating system files and/or user-generated data.

The depicted example in **Figure 2** and above-described examples are not meant to imply architectural limitations. For example, data processing system **200** also may be a notebook computer or hand held computer in addition to taking the form of a PDA. Data processing system **200** also may be a kiosk or a Web appliance. The processes of the present invention are performed by processor **202** using computer implemented instructions, which may be located in a memory such as, for example, main memory **204**, memory **224**, or in one or more peripheral devices **226-230**.

With reference now to **Figure 3**, a diagram illustrating components used in disabling recording of confidential information in a history, which includes, for example, a history list, cookie file, and cache is depicted in accordance with a preferred embodiment of the present invention. Browser **300** is an example of a browser, which may be executing on data processing system **200** in **Figure 2**.

In this example, browser **300** receives Web page **302** for presentation. Web page **302** may be obtained by entering a URL. This URL may be stored in location list **304**. Location list **304** contains URLs entered by the user. These URLs are typically entered through a field, which is often called an "address bar". Additionally, the URL may be stored in history list **306**. Further,

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history list **306** stores URLs to Web sites visited by the user by other means, such as a selection of a link. History list **306** also may contain a record of the date and time a Web page was visited by the user.

5 Cache **308** provides for temporary storage of Web pages received by the browser. For example, images and text for Web page **302** may be stored in cache **308**. Cache **308** provides a quick way to redisplay Web page **302** if the user later returns to Web page **302**. Another storage of
10 information that may be used to trace or identify Web pages visited by a user is cookie file **310**. A hidden data field, which may be included in the HTTP header of an HTML file, is a "cookie" data field. A cookie is an HTTP protocol header document element, which may be used
15 to provide multiple data elements to the browser. The information collected and stored by browser **300** are examples of data that form a history. The present invention provides a method, apparatus, and computer implemented instructions for disabling or preventing
20 recording of confidential information in a history. Recording of the history is disabled by disabling the storage of the Web page in cache **308**, and disabling the storage of the URL in history list **306** and location list **304**. Further, storage of cookies for the Web page in
25 cookie file **310** is prevented.

These different locations may contain information that is considered personal or confidential to a user. For example, cache **308** may have files that contain personal information. This type of information also may
30 be stored in a cookie within cookie file **310**. The present invention provides a method, apparatus, and

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computer implemented instructions for removing selected information from a history. The mechanism of the present invention allows for pre-defining information for removal from a history. By pre-defining the information, this information may be removed from a history without requiring user input to search for, locate, and delete the information from the history. In these examples, a user enters or defines strings of information, such as a phone number, a physical address, an e-mail address, a credit card number, a social security number, a birthday, password, a user identification, or a personal identification number.

Browser **300** may then search for the information in the history and remove the information. The removal may, for example, include deleting part of a Web page or a cookie. The information may be removed without damaging the integrity of the file or data structure in which the information is located. In these cases, the deletion of the appropriate item in a history is accomplished by removing the item in the same manner as the browser. These items include, for example, a cookie, history list item, or cache entry. For instance, a browser allow cookie management such that an individual cookie may be removed or history management such that an individual history item can be removed. The removal may be as granular as removing only the information from the Web page or cookie while leaving these data structures intact.

Additionally, the mechanism of present invention also allows a user to preview a Web page or other data structure, such as a cookie, that contains information corresponding to information defined by the user. This

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mechanism allows a user to delete a file or skip to the next one that contains information corresponding to that defined by the user.

Location list **304**, history list **306**, cache **308**, and
5 cookie file **310** are described as locations where
information forming a history may be recorded. This
information also is referred to as history information.
These locations and the processes associated with the
locations are presented for purposes of illustration and
10 are not meant to limit the mechanism of the present
invention to searching for information in these
locations.

Turning next to **Figure 4**, a block diagram of a
browser program is depicted in accordance with a
15 preferred embodiment of the present invention. A browser
is an application used to navigate or view information or
data in a distributed database, such as the Internet or
the World Wide Web. In particular, processes may be
included within browser **400** to disable recording a
20 history.

In this example, browser **400** includes a user
interface **402**, which is a graphical user interface (GUI)
that allows the user to interface or communicate with
browser **400**. This interface provides for selection of
25 various functions through menus **404** and allows for
navigation through navigation **406**. For example, menu **404**
may allow a user to perform various functions, such as
saving a file, opening a new window, displaying a
history, and entering a URL. Navigation **406** allows for a
30 user to navigate various pages and to select web sites
for viewing. For example, navigation **406** may allow a
user to see a previous page or a subsequent page relative

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to the present page. Additionally, menu **404** may allow a user to disable history recording through the selection of a button.

Preferences such as those illustrated in **Figure 4** may be set through preferences **408**. The disablement of this history recording is accomplished by setting a preference in preference **408**.

Communications **410** is the mechanism with which browser **400** receives documents and other resources from a network such as the Internet. Further, communications **410** is used to send or upload documents and resources onto a network. In the depicted example, communication **410** uses HTTP. Other protocols may be used depending on the implementation. Documents that are received by browser **400** are processed by language interpretation **412**, which includes HTML unit **414** and JavaScript unit **416**. Language interpretation **412** will process a document for presentation on graphical display **418**. In particular, HTML statements are processed by HTML unit **414** for presentation while JavaScript statements are processed by JavaScript unit **416**.

Graphical display **418** includes layout unit **420**, rendering unit **422**, and window management **424**. These units are involved in presenting Web pages to a user based on results from language interpretation **412**.

Privacy processes **426** is the portion of browser **400** in which processes for defining, locating, and removing information may be implemented in accordance with a preferred embodiment of the present invention. Of course, these processes may be implemented elsewhere, such as, for example, in a plug-in or as a separate

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application or program.

Browser **400** is presented as an example of a browser program in which the present invention may be embodied.

Browser **400** is not meant to imply architectural

5 limitations to the present invention. Presently available browsers may include additional functions not shown or may omit functions shown in browser **400**. A browser may be any application that is used to search for and display content on a distributed data processing system. Browser
10 **400** may be implemented using known browser applications, such as Netscape Navigator or Microsoft Internet Explorer. Netscape Navigator is available from Netscape Communications Corporation while Microsoft Internet Explorer is available from Microsoft Corporation.

15 With reference now to **Figure 5**, a diagram of graphical user interface for defining privacy preferences is depicted in accordance with a preferred embodiment of the present invention. Window **500** is an example of a graphical user interface (GUI), which may be used to
20 obtain user input in pre-defining information that is to be removed from a history.

In this example, field **502** contains entries **504**,
506, **508**, and **510**. Entry **504** is a phone number, entry
506 is a social security number, entry **508** is a birthday,
25 and entry **510** is a password. These are strings of information that are removed from a history by the browser in these examples. Additional entries may be defined by selecting "Add" button **512**. Entries may be removed by selecting an entry and "Delete" button **514**.
30 Additionally, multiple entries may be selected and deleted using "Delete" button **514**. Selection of "Done"

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button **516** closes the window. Selection of "Preview" button **518** results in a display of Web pages containing the confidential information, as described with respect to **Figure 7** below.

5 Turning next to **Figure 6**, a diagram of a input window is depicted in accordance with a preferred embodiment of the present invention. Window **600** is an example of a window, which may be displayed in response to "Add" button **512** in **Figure 5**. Information that is to
10 be removed from a history may be defined or entered in field **602** by a user. The information is entered in the form of a string in these examples. Selection of "Okay" button **604** results in the entry being added to field **502** in **Figure 5**. Selection of "Cancel" button **606** results in
15 any input into field **602** being canceled and the closure of window **600**.

With reference now to **Figure 7**, a diagram of a preview of Web pages is depicted in accordance with a preferred embodiment of the present invention. Window
20 **700** is generated in response to a selection of "Preview" button **518** in **Figure 5**. In these examples, the preview presents thumbnails, such as thumbnails **702**, **704**, **706**, **708**, **710**, **712**, **714**, **716**, and **718**. A thumbnail is a miniature representation of a Web page or image. A
25 thumbnail may be generated by a thumbnail program. This program may be stand-alone or part of a desktop publishing or graphics program. Thumbnails provide a convenient way to browse through multiple images before retrieving the one you need. Programs often let a user
30 click on the thumbnail to retrieve a full or larger representation of the Web page or image.

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Selection of "Cancel" button **720** results in window **700** being closed. Selection of one of the thumbnails results in a Web page associated with the Web page being opened and presented for review as described below in

5 **Figure 8.**

Turning next to **Figure 8**, a diagram of a Web page presented in a window is depicted in accordance with a preferred embodiment of the present invention. Window **800** is an example of a window presented in response to a selection of a thumbnail, such as those illustrated in **Figure 7**. Web page **802** is presented within window **800**. This Web page is associated with a thumbnail selected in window **700** in **Figure 7**. In this example, confidential information **806** is located within Web page **802**.

15 Confidential information **806** may be, for example, a credit card number, a birth date, or a social security number. Selection of "Delete" button **804** results in confidential information **806** within Web page **802** being deleted or removed from the history while leaving the remainder of Web page **802** intact. Alternatively, the entire Web page may be deleted. Selection of "Cancel" button **808** results in the closing of window **800**.

A similar type of window may be used to present other data structures that may contain confidential information, such as a cookie. In this instance, the cookie may be represented with a graphical representation or an icon rather than a thumbnail. Selection of this representation results in the information within the cookie being displayed to the user. The selection of a node results in a representation of the Web page or cookie similar to that in **Figure 8**.

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With reference now to **Figure 9**, a flowchart of a process used for removing information from a history is depicted in accordance with a preferred embodiment of the present invention. The process illustrated in **Figure 9** may be implemented in a browser, such as browser **400** in **Figure 4**.

The process begins by selecting an unprocessed confidential entry from a list (step **900**). The list is one that is pre-defined or generated by a user in these examples. This list may be generated through a GUI, such as window **500** in **Figure 5**. Next, a search is made for confidential information within the history matching the confidential entry from the list (step **902**). Each instance of information matching a confidential entry is deleted from the history (step **904**). A determination is then made as to whether more unprocessed confidential entries are present (step **906**). If more unprocessed confidential entries are present, the process returns to step **900** as described above. Otherwise, the process terminates.

Turning next to **Figure 10**, a flowchart of a process used for defining information for removal is depicted in accordance with a preferred embodiment of the present invention. The process illustrated in **Figure 10** may be implemented in a browser, such as browser **400** in **Figure 4**. These processes are used in conjunction with a GUI, such as those illustrated in **Figures 5-8**.

The process begins by displaying a presentation window (step **1000**). This presentation window may be, for example, window **500** in **Figure 5**. Next, a user input is received (step **1002**). This user input is typically made

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through a pointing device, such as, for example, a mouse, a trackball, a touchpad, a light pen, or a keyboard.

A determination is then made as to whether an entry has been selected by the user input (step **1004**). If an entry
5 has been selected, the selected entry is highlighted (step **1006**) and the process returns to step **1002** as described above.

If an entry has not been selected by the user input, a determination is made as to whether the user input is a
10 selection of a "Delete" button (step **1008**). If the user input is a selection of a "Delete" button, any selected entries are deleted (step **1010**) with the process returning the step **1002** as described above. Otherwise, a determination is made as to whether the user input is the
15 selection of an "Add" button (step **1012**). If the user input is the selection of an "Add" button, a new entry is added (step **1014**) with the process returning to step **1002** as described above. The adding of the entry may take place using an interface, such as window **600** in **Figure 6**.

20 If the user input is not the selection of the "Add" button, then a determination is made as to whether the user input is the selection of a "Preview" button (step **1016**). If the user input is a selection of a "Preview" button, the preview process is initiated (step **1018**) with
25 the process returning to step **1002** as described above. The preview process is performed using window **700** in **Figure 7** and window **800** in **Figure 8**.

Otherwise, a determination is made as to whether the user input is the selection of a "Done" button (step
30 **1020**). If the user input is the selection of a "Done" button, the process terminates. Otherwise, the process

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returns to step **1002** as described above.

Turning next to **Figure 11**, a flowchart of a process used for defining information for removal is depicted in accordance with a preferred embodiment of the present invention. The process illustrated in **Figure 11** may be implemented in a browser, such as browser **400** in **Figure 4**.

The process begins by receiving a user input to add a confidential entry (step **1100**). This user input may be the selection of a control, such as "Add" button **512** in **Figure 5**. Next, the user is presented an input window (step **1102**). This input window may be implemented using window **600** in **Figure 6**. Thereafter, a user input is received (step **1104**). A determination is made as to whether the user input is an entry of a new confidential entry (step **1106**). A new confidential entry may be made in a field, such as field **602** in **Figure 6**. If the user input is not the entry of a new confidential entry, a determination is made as to whether the user input is to cancel the procedure (step **1108**). The procedure may be canceled using a control, such as "Cancel" button **606** in **Figure 6**. If the user input is not to cancel the procedure, the process returns to step **1104** as described. Otherwise, the user is returned to the presentation window (step **1110**) with the process terminating thereafter. The presentation window may be, for example, window **500** in **Figure 5**.

Turning back to step **1106**, if the user input is the selection of a new confidential entry, the confidential entry is added to the list (step **1112**) and the process proceeds to step **1110** as described above.

With reference now to **Figure 12**, a flowchart of a process used for previewing Web pages containing confidential information is depicted in accordance with a preferred embodiment of the present invention. The process illustrated in **Figure 12** may be implemented in a browser, such as browser **400** in **Figure 4**. The process may be implemented using, window **500** in **Figure 5**, window **700** in **Figure 7**, and window **800** in **Figure 8**.

The process begins by receiving a selection of a confidential entry (step **1200**). This selection may be initiated through a selection of "Preview" button **518** in **Figure 5**. Next, a search for Web pages containing the confidential entry is made (step **1202**). Thumbnails of pages containing information matching the confidential entry are presented to the user (step **1204**). A user input is then received (step **1206**). A determination is then made as to whether the user input is the selection of a "Cancel" button (step **1208**).

If the user input is the selection of a "Cancel" button, the process terminates. Otherwise, a determination is made as to whether the user input is the selection of a thumbnail (step **1210**). If the user input is not the selection of a thumbnail, the process returns to step **1206** as described above. If the user input is the selection of a thumbnail, a Web page corresponding to the thumbnail is displayed to the user (step **1212**).

Next, a second user input is received (step **1214**). A determination is then made as to whether the second user input is the selection of a "Delete" button (step **1216**). If the second user input is not the selection of a "Delete" button, a determination is made as to whether

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the second user input is the selection of a "Cancel" button. If the answer to this determination is no, the process returns to step **1214** as described above. If the second user input is the selection of a "Cancel" button, 5 the display of the Web page is removed (step **1220**) and the process returns to step **1206** as described above. With reference again to step **1216**, if the second user input is the selection of a "Delete" button, the information within the Web page corresponding to the 10 confidential entry is deleted (step **1222**) with the process proceeding to step **1220** as described above.

A similar process may be used to preview or review information within a cookie file. Icons may be used to represent information with text information being 15 displayed from a cookie in response to the selection of an icon.

Thus, the present invention provides an improved method, apparatus, and computer implemented instructions for pre-defining information for removal from a history. 20 The mechanism of the present invention allows for searching a history for entries or confidential information corresponding to the pre-defined information. This information may then be removed from the history. The removal may, for example, include deleting a Web page 25 or a cookie. The removal may be as granular as removing only the information from the Web page or cookie while leaving these data structures intact. The mechanism of present invention also allows a user to preview a Web page or other data structure, such as a cookie, that 30 contains information corresponding to information defined by the user. This mechanism allows a user to delete a file or skip to the next one that contains information

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corresponding to that defined by the user.

It is important to note that while the present invention has been described in the context of a fully functioning data processing system, those of ordinary skill in the art will appreciate that the processes of the present invention are capable of being distributed in the form of a computer readable medium of instructions and a variety of forms and that the present invention applies equally regardless of the particular type of signal bearing media actually used to carry out the distribution. Examples of computer readable media include recordable-type media, such as a floppy disk, a hard disk drive, a RAM, CD-ROMs, DVD-ROMs, and transmission-type media, such as digital and analog communications links, wired or wireless communications links using transmission forms, such as, for example, radio frequency and light wave transmissions. The computer readable media may take the form of coded formats that are decoded for actual use in a particular data processing system.

The description of the present invention has been presented for purposes of illustration and description, and is not intended to be exhaustive or limited to the invention in the form disclosed. Many modifications and variations will be apparent to those of ordinary skill in the art. The embodiment was chosen and described in order to best explain the principles of the invention, the practical application, and to enable others of ordinary skill in the art to understand the invention for various embodiments with various modifications as are suited to the particular use contemplated.